

Utah Test and Training Range
Issued February 13, 2003

ATTACHMENT 3

**WASTE ANALYSIS PLAN
FOR RESIDUE AND ASH**

WASTE ANALYSIS PLAN FOR RESIDUE AND ASH

1.0 Introduction

This Waste Analysis Plan (WAP) was prepared to support the RCRA Subpart X Permit Application for the Utah Test and Training Range – North (UTTR-North) Thermal Treatment Unit (TTU). This WAP provides guidance for the sampling and analysis activities of residue and ash for the permitted operation of the TTU sites. This plan will be kept at UTTR Environmental Management Office at Oasis.

The WAP was developed to ensure that all waste streams treated at the TTU are properly characterized (i.e., that the hazardous constituents they contain or may release through thermal treatment are sufficiently identified). Because the nature of military munitions does not allow the reactive filler or components to be analyzed prior to treatment, generator knowledge of the waste munitions constituents and characteristics is used in place of standard waste stream sampling.

2.0 UTTR-North TTU Description

2.1 Site History

The TTU has been operating for more than 30 years. During that time it has treated solid propellant energetic pyrotechnics (PEP) items using both open burning (OB) and open detonation (OD) thermal treatment processes.

2.2 Site Description

The TTU occupies approximately 2 square miles in a gently southwestward sloping valley. This area is located approximately 5 miles northeast of the UTTR-North range support facility (Oasis) and 20 miles north of Utah Exit 62 on Interstate 80. Access to the TTU is provided via Box Elder County Road, which runs from Interstate 80 northward to the Southern Pacific Railroad work site at Lakeside. Figure 1 of Attachment 1 shows the location of the TTU.

The TTU contains three sites used for treating waste ordnance by OB and/or OD. The TTU also has a hazardous waste accumulation point for residue generated during OB operations. The three sites are shown in Figure 3, Attachment 1. Site 1 is the rocket motor and scrap propellant OB pad. Site 2 consists of three pads used as staging areas for munitions treated by OB/OD in areas adjacent to the pads; actual operations take place on the soils immediately to the west of each pad. Site 3 is the munitions burn pan where small arms ammunition, flares, cartridge actuated devices (CADs), and propellant-actuated devices (PADs) are demilitarized by OB. This burn pan is located approximately 150 ft southwest of the burn pit it replaced. A more complete description of each of these sites is included in Attachment 1.

3.0 Waste Acceptance

The responsibility for waste identification at the UTTR-North TTU lies with both the generating unit and the 75 CEG/CED, EOD Division. The generating unit first performs waste identification, as necessary, in the process of completing the required waste turn-in document DD Form 1348-1. If the identification of a suspected waste is beyond the capacity of the generating unit, EOD assists in identifying the hazardous wastes during the turn-in process. Regardless of which organization (on-site or off-site) identifies the wastes, the wastes must be identified and characterized in accordance with the procedures in this WAP.

The following sources of information may be used to identify the characteristics and constituents of reactive waste items and materials:

- Package information;
- NSN;
- Local Stock Number;
- Federal Supply Class;
- DoD Hazardous Material Information System;
- National Fire Protection Agency Fire Protection Guide on Hazardous Materials;
- DOT Emergency Response Guide;
- National Institute for Occupational Safety and Health: (1) Pocket Guide to Chemical Hazards and (2) Occupational Health Guidelines for Chemical Hazards, Industrial Chart for Toxic and Hazardous Chemicals in Industry;
- EPA Document: “A Method for Determining the Compatibility of Hazardous Wastes;”
- MSDS provided by manufacturer;
- Contact with manufacturer;
- Technical Order (TO) 60A-1-1-9, “Description of and Disposal Procedures for Conventional Explosives and Related Hazardous Materials;” and
- TO 60A-1-1-31, “General Information on EOD Disposal Procedures.”

In cases where the data provided are not sufficient to characterize the waste munition, EOD personnel will request additional information from the generator prior to treatment operations. No waste munition will be treated by OB/OD until EOD personnel are satisfied that both the physical and chemical data are sufficient to ensure the selected treatment process is appropriate, effective, and safe.

If a new type of munition is added to the inventory, OO-ALC/EM will provide written notice of the waste stream modification to DSHW. The notice will include a description of the components and combustion by-products.

Agencies requesting treatment of waste munitions and explosives at the TTU must submit their request to OO-ALC/EM. At a minimum, this request must include:

- Complete nomenclature and characterization data (e.g., MSDS) of waste munitions;
- Quantity to be treated;
- A statement that the items were manufactured under AF contract, are U.S. government property, and are authorized for treatment;
- Justification for treatment of the items, including a detailed description of the item and condition; and
- Instructions for treatment of any residue generated as a result of the treatment operation.

Once accepted for treatment, and prior to acceptance at the TTU, EOD personnel inspect the shipment to ensure the waste is properly identified, packaged, and manifested. As part of the inspection process, EOD personnel check the physical properties of the waste items against a database of specifications maintained for all wastes historically treated at the TTU.

As part of the waste acceptance policy, EOD personnel will ensure proper tracking of accepted wastes. EOD personnel will use the following procedures for tracking incoming items:

- Whole Motors: EOD personnel will count the number of missile or rocket motors and verify the serial numbers with the hazardous waste manifest.
- Propellant: EOD personnel will check the shipment against the manifest, verifying the nomenclature and quantity.
- Internal Shipments: EOD personnel will count the items and verify that the items are listed on the hazardous waste manifest. EOD will also verify the control number on each manifest.
- Odd Shipments: EOD personnel will coordinate the shipment with the generating agency and verify that all items received are listed on the hazardous waste manifest.

4.0 Parameters and Rationale [40 CFR 264.13(b)(1) and UAC R315-8-2.4]

All waste munitions treated at the TTU are standard military end items with well-defined physical and chemical characteristics. In addition, due to the nature of the waste stream, direct representative analysis of military munitions and energetic wastes is not proposed as a part of this WAP. Rather, post-treatment analysis is proposed to be used to ensure that the OB units at UTTR-North TTU sites are properly evaluated during the operating life of the permitted units.

Treatment operations may generate two classes of solid waste, ash residue (resulting from the OB treatment process) and solid residue (e.g., large metals fragments, pieces of PEP). Figure 1 presents a flowchart of the decision matrix used for classification and treatment of ash and other residue.

Since the solid residue may have come in contact with the reactive component(s), it is inspected in accordance with TO 11A-1-60, "Inspection of Reusable Munitions Containers and Scrap Material Generated from Items Exposed to, or Containing Explosives." If after inspection this residue is determined to contain residual reactive materials, the residue is re-treated. If it no

longer exhibits a reactive characteristic and does not contain any RCRA-listed metals, it is managed as solid waste.

Since the remaining ash may contain RCRA-listed metals, as soon as it is safe to do so it is containerized and sampled. While the samples are awaiting analysis, the containers are temporarily stored at the TTU's hazardous waste accumulation site (see Figure 3, Attachment 1).

The samples are analyzed based on the Toxicity Characteristic Leaching Procedure (TCLP). Analysis is conducted by a Utah-certified laboratory. If the laboratory analysis indicates the ash contains RCRA-listed metals, the containers are removed to a permitted hazardous waste disposal facility meeting the land disposal requirements of 40 CFR 268. If the analytical results indicate that the ash does not contain RCRA-listed metals, the ash is managed as solid waste.

Soil, ash, and munitions residues were collected from the TTU treatment sites following OD and OB of propellant and other munition items from February 1994 through July 1996. Of the 107 samples collected, 56 had detectable levels of RCRA-listed metals, with 15 of the samples having one or more metals at levels higher than regulatory thresholds. These 15 samples are listed in Table 1.

5.0 Test Methods [40 CFR 264.13(b)(2)]

Post-treatment sampling is performed on the ash when it is removed from the OB sites in order to assist OO-ALC/EM in making hazardous waste determinations per 40 CFR 262.11. With the exception of large metal fragments, no waste materials, ash, or other residue remain after the OD treatment process; therefore, post-treatment residues from OD activities are not proposed to be analyzed. Routine soil sampling is conducted at the TTU sites to confirm treatment effectiveness, as specified in the sampling and analysis plan (SAP) (Attachment 9, Section A).

Waste explosives whose waste characteristics are unknown will not be treated at the TTU. The current treatment methods to be used for all future OB/OD operations are specified in AF TOs, as shown in Table 2. Future treatment operations at the TTU will use existing published data that meet the general waste analysis requirements listed in this section.

All analytical tests are performed by a Utah-certified laboratory and are conducted in accordance with the protocol found in the most recent edition of EPA SW-846, "Test Methods for Evaluating Solid Waste, Physical and Chemical Methods." Specific test methods may include ignitability (SW-846 Method 1010/1020), corrosivity (SW-846 Method 1110), reactivity (SW-846 Vol. 1, Chapter 7, Section 3), TCLP (SW-846 Method 1311), metals by inductively coupled plasma spectroscopy (SW-846 Method 6010), metals by atomic absorption spectroscopy (SW-846 7000 Series Methods), and explosive compounds (SW-846 Method 8330). As new methods are developed and become available, they will be used accordingly. All analytical reports are maintained by OO-ALC/EM.

6.0 Sampling Methods [40 CFR 264.13(b)(3), 261 Appendix I, and 266 Appendix IX and UAC R315-8-2.4]

The sampling equipment and collection/handling methods used for new, unknown, process changes, or reverification of wastes generated at the UTTR-North TTU sites follow EPA-

approved sampling protocols contained in the most recent edition of SW-846. The following general sampling procedures and precautions are followed:

- Appropriate safety equipment (e.g., gloves and safety glasses) are worn during sampling. This requirement varies based on the specific chemical properties of the waste and the circumstances under which it is being sampled.
- Only non-sparking equipment is used during sampling.
- All necessary sampling equipment is within reach of the sampler before the sample is collected.

The ash or other residue will be sampled using a stainless steel scoop. This equipment and specified method are described in SW-846.

Specific samples will be collected based on the following methodology:

- Using a stainless steel or Teflon-lined scoop, collect four grab samples from within the OB unit. Composite the four grab samples by thoroughly mixing in a stainless steel bowl. Scoop the composited sample into an appropriate-sized glass sample container. Sample size will be determined by the amount required for the analytical method(s) (typically 500 g will be collected). Immediately seal the sample container after sample collection. Sample seals are used to preserve the integrity of the samples from the time they are collected until they are opened in the laboratory.
- Record all required information on the sample bottle and chain-of-custody record including the preservation method and maximum holding time. All sample labels will be marked with the following information using indelible ink: name of the sampler, date and time of collection, sample collection location, and sample identifier that uniquely identifies the sample. The chain-of-custody record, at a minimum, includes the following information:
 - Sample collection location;
 - Date and time of collection;
 - Sample type (grab or composite);
 - Sample description (waste type);
 - Analyses to be performed; and
 - Signatures of the personnel involved in the custody of the samples.
- Analyze the sample using a Utah-certified laboratory in accordance with EPA SW-846. Samples will be delivered to the laboratory as soon as practical. The chain-of-custody accompanies the samples. Samples are properly packaged to avoid leakage or breakage during shipment.

Sampling devices and containers are cleaned before use. All used non-disposable containers and samplers are washed with warm detergent solution, rinsed at least three times with tap water,

rinsed with distilled water, and air dried or wiped dry. All clean samplers, containers, etc., are placed in clean plastic bags and sealed. The cleaned and packaged equipment is stored in an appropriate area away from all new sampling equipment.

7.0 Frequency of Analysis [40 CFR 264.13(b)(4) and UAC R315-8-2.4]

All waste streams treated at the TTU sites are energetic materials that have been manufactured in accordance with military specifications and strict manufacturing requirements. As such, these waste streams consist of PEP materials that are known.

Therefore, as discussed above, no pre-treatment analyses will be performed on the energetic waste streams treated at the OB and OD units. However, post-treatment analyses will be conducted to demonstrate treatment effectiveness and compliance with soil environmental performance standards, as well as for the proper disposition of the ash generated during OB treatment activities.

All ash generated during each OB treatment event will be collected, placed in storage containers meeting the requirements of 40 CFR 265.171, and transported to the TTU's hazardous waste accumulation point. Samples from the storage container(s) will be collected and analyzed for TCLP metals to determine whether the container contents are hazardous.

If the sampling results indicate the ash is hazardous, then the containers are removed to a permitted hazardous waste disposal facility and then transported to a permitted hazardous waste disposal facility that meets the land disposal requirements of 40 CFR 268.

If the sampling results indicate the ash is not hazardous, then the ash is managed as a solid waste.

The nature of OD treatment allows for the complete destruction of the energetic materials, leaving only waste metal fragments (See Section 8 – OB/OD Treatment Effectiveness). Therefore, no sampling of this material is proposed to be conducted.

Soil sampling will be performed within each TTU site. This sampling will provide information on the nature and extent of chemical contamination. Sampling requirements are discussed in detail in the SAP (Attachment 9, Section A).

8.0 OB/OD Treatment Effectiveness [40 CFR 264.602 and 270.23(d) and UAC R315-8-16 and R315-3-6.8(d)]

OB/OD treatment effectiveness can only be measured through environmental performance analysis rather than technical performance standards (e.g., destruction and removal efficiency, such as for an incinerator), and is verified through measurements made in the field and during tests. The air and soil environmental assessments described in Attachment 10 - which provide an estimate of levels of risks - correspond to an estimate of the treatment effectiveness of the OB/OD process. This may not only be evaluated from a quantitative basis, but also from a qualitative perspective. For example, the rate of treatment and effectiveness is directly proportional to the treatment procedures applied by EOD personnel.

The objective of each OB or OD event is to completely treat the reactive components of a waste munition item, or group of items. Maximum effectiveness is achieved by EOD personnel following procedures written for all of DoD by the U.S. Naval EOD Technology Division. These are published as TOs. They represent years of testing and refinement, incorporating engineered approaches selected for their ability to achieve maximum treatment effectiveness. TOs, together with service-specific safety manuals and unit-specific operating instructions, are used to ensure that munitions are safely and effectively demilitarized (see Table 2). Each EOD technician is extensively trained and highly skilled in all ordnance treatment operations. Their skill and competence in treating ordnance thus represent the first level used to ensure maximum treatment effectiveness is achieved. Application of these skills - and avoidance by EOD personnel of certain adverse climatic events, such as high winds, rain, or electrical storms, which could endanger their lives - has been proven to provide desirable results from OB or OD treatment operations. Following all treatments by OB/OD, EOD personnel inspect the area encircling the treatment site to determine the effectiveness and completeness of the operation.

The most conclusive means of measuring the effectiveness of OB/OD is through a periodic sampling program that can be applied to all potentially affected media. A sampling and analysis program is capable of determining whether any media have been adversely impacted by treatment operations. The program to be conducted at the TTU is described in more detail in the SAP (Attachment 9, Section A).

Treatment effectiveness can also be evaluated using tests. Since 1989, the U.S. Army's DPG has conducted a series of tests to identify and quantify the emissions produced by the OD of selected munition items. The sampling and analysis methods used to detect and quantify the air emissions are based on EPA-approved methods. All tests were conducted at DPG within a 1000-m³ flexible hemisphere, commonly known as the BangBox. These tests have been successfully audited by regulatory agencies. This test program is supported by a technical steering committee and a network of laboratories specializing in the sampling and assay of air contaminants trace levels.

In all the tests, nearly all the carbon in the explosive mixtures was converted to CO₂ during the detonation process. All detected emissions were found at very low levels, typically at the parts per trillion level. Accordingly, OD appears to be an environmentally suitable method for disposing of the tested materials.

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Table 1 Chemical Analysis of TTU Treatment Residue

Sample Date	Residue	Silver (5.0)^a	Arsenic (5.0)^a	Barium (100.0)^a	Cadmium (1.0)^a	Chromium (5.0)^a	Mercury (0.2)^a	Lead (5.0)^a
15 February 1994	Ash; munitions	0.100	NA	4.50	2.00	0.200	NA	103.7
15 February 1994	Ash; munitions	0.100	NA	5.60	3.30	0.400	NA	110.1
15 February 1994	Ash; munitions	ND	NA	0.700	ND	ND	NA	9.90
15 February 1994	Ash; munitions	ND	NA	1.70	ND	0.500	NA	27.0
15 February 1994	Ash; munitions	ND	NA	0.300	ND	ND	NA	8.00
29 June 1995	Soil; ash; munitions	0.100	ND	17.0	1.40	0.100	ND	80.1
29 June 1995	Soil; ash; munitions	0.200	ND	33.1	8.60	0.200	ND	14.0
29 June 1995	Soil; ash; munitions	0.200	ND	7.00	0.200	2.20	ND	11.0
10 September 1995	Soil; ash	NA	NA	4.40	1.50	NA	NA	114.4
19 April 1996	Soil; ash	ND	NA	0.690	20.88	ND	NA	6.93
19 April 1996	Soil; ash	ND	NA	0.540	54.21	ND	NA	11.39
4 June 1996	Soil; ash	0.100	NA	6.14	4.59	ND	NA	13.74
31 July 1996	Soil; ash	ND	NA	8.63	2.41	0.050	NA	1160
31 July 1996	Soil; ash	ND	NA	5.89	1.63	ND	NA	6.54
31 July 1996	Soil; ash	ND	NA	3.18	1.27	ND	NA	172.0

^a Regulatory levels in mg/L, sample results in ppm

NA = not applicable

ND = not detected

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Table 2 OB/OD Operational Directives

Number and Date	Title and Security Classification	Purpose
22 December 1993	□Management Plan for Disposal of Hazardous Waste Air munitions, Propellants, and Explosive Material,□ Unclassified	Assigns responsibilities and prescribes processes for managing, treating, and disposing of unserviceable, excess, and obsolete air munitions and missile components in accordance with federal, state, and local hazardous waste regulations
EOI 127-7, 15 August 1994	□Transportation of Demolition Explosives,□ Unclassified	Prescribes the procedures for transporting demolition explosives on- and off-base by EOD personnel (Note: All EOIs are published by the EOD Division at Hill AFB)
EOI 136-3, 9 April 1996	□Disposal Procedures for Ammunition Disposition Report Munitions,□ Unclassified	Establishes procedures to be used by qualified EOD personnel to dispose of ADR munitions at UTTR-North TTU
EOI 136-30, 10 August 1995	□Disposal Procedures for Large Rocket Motors,□ Unclassified	Establishes EOD procedures for treatment of rocket motors
AFM 91-201, 1 December 1996, as supplemented	□Explosives Safety Standards,□ Unclassified	Implements AF policy regarding explosives safety. It details procedures to be used during explosives testing, storage, transportation, and treatment
TO 11A-1-42, 1 March 1979, with change 28, 28 August 1996	□General Instructions for Disposal of Conventional Munitions,□ Unclassified	Provides detailed instructions to EOD personnel in the treatment of unserviceable, serviceable excess, or obsolete munitions and explosive items (except nuclear)
TO 11A-1-60, 19 March 1993, with change 2, 27 November 1995	□Inspection of Reusable Munitions Containers and Scrap Material Generated from Items Exposed to, or Containing Explosives,□ Unclassified	Establishes the requirements for an inspection and certification program to prevent the sale, transfer, turn-in, treatment, or shipment of material or reusable munitions containers contaminated by explosives
TO 60A-1-1-9, 27 October 1993	□Description of and Disposal Procedures for Conventional Explosives and Related Hazardous Materials,□ FOUO	Furnishes EOD personnel with basic information necessary for the recognition, identification, and treatment of conventional explosives and related material
TO 60A-1-1-31, 19 January 1982, with change 10, 31 May 1994	“EOD Disposal Procedures: General Information on EOD Disposal Procedures,□ FOUO	Provides EOD personnel with basic information on effective and safe EOD treatment procedures. The treatment procedures described cover low and high explosives and incendiary items

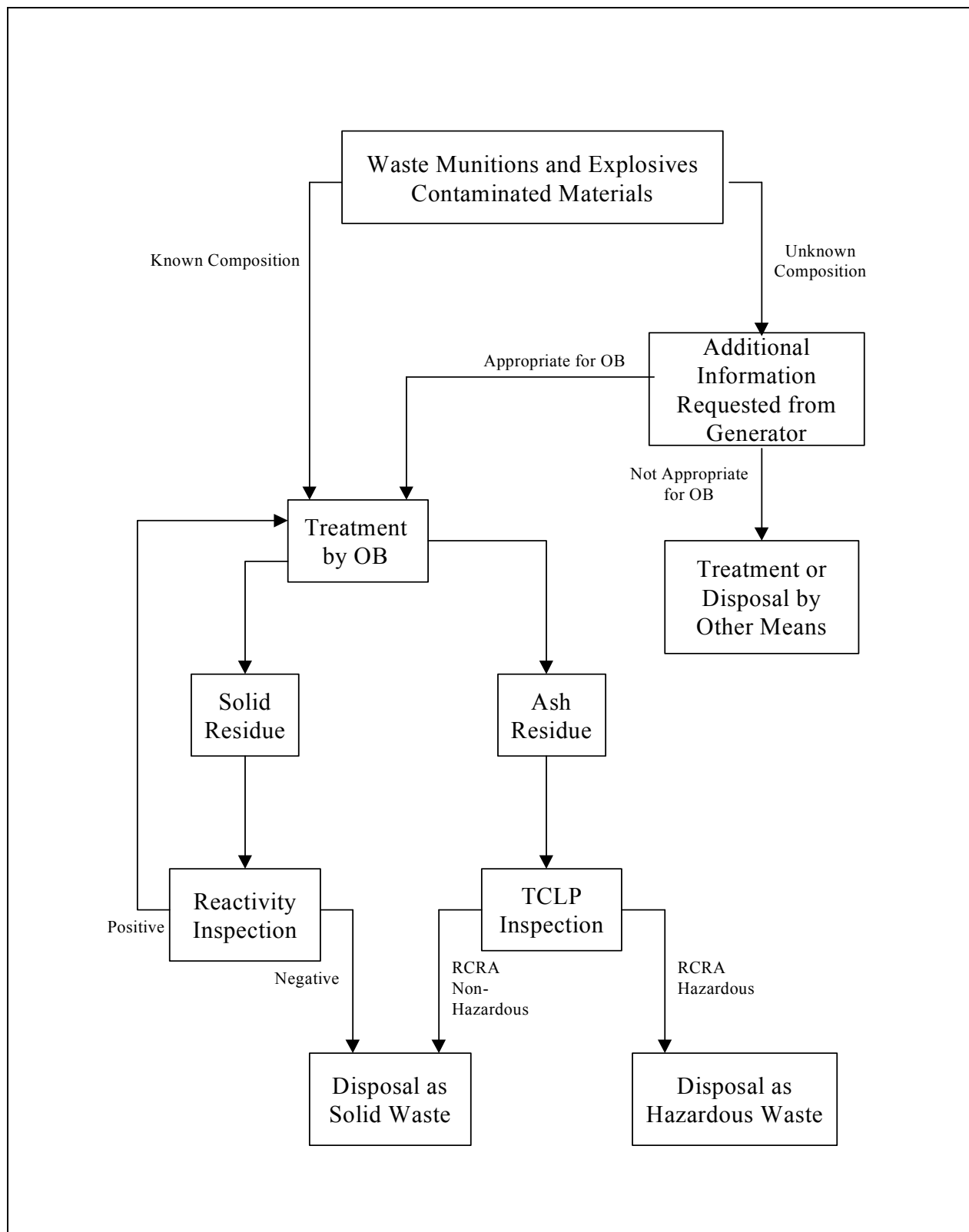


Figure 1. Waste Analysis Plan Decision Matrix